

## CLAIMS

1. Concrete of specified compressive strength  $f_c'$  and modulus of rupture (MR) up to 5,000 and more than 750 psi, respectively, with coarse aggregate defined as enriched limestone waste which is processed by-product of manufacture of crushed limestone mainly of regular Sizes numbers 56, 57, 6, and 67 with the rated dimensions 25-9.5mm, 25-4.75 mm, 19-9.5mm, and 19-4.75mm, respectively, this by-product as a raw material for enrichment should be finer 3/8 in.(9.5 mm) and coarser than 4.75mm (Sieve No.4), enrichment of this by-product can be carried out by washing or screening, or by a combination of washing and screening separately for parts finer and coarser than 4.75mm with the consequent mixing of these parts or without this separation depending on the results of sieve analysis of this aggregate, amount of aggregate finer than 4.75 mm at quarry before enrichment should be at least the value of the same order as that for the least Size of coarse aggregate number 89 according to ASTM C 33 and not less than about 1/3 of the total weight of aggregate, the proportions between the amounts of aggregate finer and coarser than 4.75mm before enrichment should be determined taking into account an inevitable breakdown of aggregate due to handling and transportation from quarry to aggregate bin of concrete plant, after enrichment of limestone waste the amount of aggregate finer than 2.36 mm (Sieve No.8) should not exceed about 10% of the total weight of aggregate, the amount of aggregate finer than 1.18mm (Sieve No. 16) should not exceed about 7 % of the total weight of aggregate, the amount of aggregate finer than 300 $\mu$ m Sieve No. 50) should not exceed about 2 % of the total weight of aggregate, after transportation of aggregate to the aggregate bin of concrete plant the amount of aggregate finer than 4.75 mm should be less than that of the largest Size of fine aggregate number 9 according to ASTM C33 and close to but not exceeding 2/3 of the total weight of aggregate, the amount of aggregate finer than 300  $\mu$ m (Sieve No.50) should not exceed about 3.0% of the total weight of aggregate, grading of enriched limestone waste after transportation to a concrete plant should be finer than that of the least Size of coarse aggregate Number 89 and coarser than that for the largest Size of fine

aggregate Number 9 according to ASTM C33 and can be considered as intermediate between the coarse and fine aggregates in Terminology of ASTM C125, physical properties of this coarse aggregate should be in accordance with requirements of ASTM C33, compressive strength of concrete should be higher than that for concrete of the same consumption of cement with crushed limestone of the Size Number 89 as a coarse aggregate and higher or at least close to that for concrete of the same consumption of cement and twice as high consumption of admixture with crushed granite of regular sizes as a coarse aggregate while the flexural strength of this concrete is higher than that for concrete of the same consumption of cement with crushed granite as a coarse aggregate, the values of the modulus of rupture (MR) of concrete equal to 550, 600, 650, 700, and 750psi correspond to the values of the specified compressive strength  $f_c'$  of this concrete equal to 3,000, 3,500, 4,000, 4,500, and 5,000 psi, respectively.

2. Concrete with coarse aggregate which is processed by-product of manufacture of crushed limestone mainly of regular Sizes numbers 56, 57, 6, and 67 with the rated dimensions 25-9.5mm, 25-4.75 mm, 19-9.5mm, and 19-4.75mm, respectively, defined as enriched limestone waste, this by-product as a raw material for enrichment should be finer than 3/8 in.(9.5 mm) and coarser than 4.75mm (Sieve No.4), enrichment of this by-product can be carried out by washing or screening, or by combination of washing and screening separately for parts finer and coarser than 4.75mm with consequent mixing of these parts or without this separation depending on the results of sieve analysis of this aggregate, amount of aggregate finer than 4.75 mm at quarry before enrichment should be at least the value of the same order as that of the least Size of coarse aggregate number 89 according to ASTM C33 and not less than about 1/3 of the total weight of aggregate, the proportions between the amounts of aggregate finer and coarser than 4.75mm before enrichment should be determined taking into account an inevitable breakdown of aggregate due to handling and transportation from quarry to aggregate bin of concrete plant, due to the excessive breakdown of aggregate of high water-absorption under adverse conditions of transportation to concrete plant the amount of aggregate finer

than 4.75 mm in the aggregate bin exceeds  $\frac{2}{3}$  of the total weight of aggregate, grading of this aggregate corresponds to that of the largest Size of fine aggregate number 9 according to ASTM C33, compressive and flexural strength of concrete with coarse aggregate of this grading will be less at least by 10% than that for concrete of the same consumption of cement with crushed granite of regular sizes as a coarse aggregate, specified compressive strength and modulus of rupture (MR) of concrete amount up to 4,000 and 650 psi, respectively.